Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Self- Focusing and Channeling of Relativistic Laser Pulses in Underdense Plasmas NEDA NASERI, WOJCIECH ROZMUS, Department of Physics-University of Alberta-Edmonton-Canada — We studied in details the ponderomotive channeling of the intense laser pulse in underdense homogeneous plasma using 3D PIC simulations, considering different laser powers and plasma densities. We found limits on plasma density in order to get fully evacuated channels. Also the effects of surface wakes on destruction of electron evacuated channels have been addressed. Evacuation can be lost due to surface wave excitation on the channel edges. The wavelength of the surface waves has been calculated in cylindrical geometry for arbitrary laser intensity on the channel edges. The rise time of the laser pulse plays an important role on the stability of the channels. We also found that the dominant mechanisms in higher densities is hosing and filamentation of the laser pulse. Formation of ring structure, central electron density enclosed by a hollow ring, has been observed in 3D simulations. We have also found that analytical multi-channel solutions are unstable due to the interaction between filaments. The simulation results are in a very good agreement with existing analytical results.

[1] Kim et al. Phys. Rev E, 65,036416 (2002)

Neda Naseri
Department of Physics-University of Alberta-Edmonton-Canada

Date submitted: 17 Jul 2009 Electronic form version 1.4